

11.生态系统动态与可持续发展

Initial litter quality regulates the contribution of soil fauna to nutrients release during litter decomposition-a global analysis

朱贵青、吴福忠、岳楷、苏俊、袁朝祥、郭鸿蓉、吴捷录、张雪、彭艳

Key Laboratory for Humid Subtropical Eco-Geographical Processes of the Ministry of Education, School of Geographical Sciences, Fujian Normal University

摘要: Soil fauna plays a great contribution in litter decomposition, but the contribution to carbon (C) and nutrients release, as well as the changes of litter quality are not clear worldwide. Therefore, we conducted a meta-analysis of experimental research data from 5254 paired field observations from 159 peer-reviewed and publicly available papers at the global scale. Overall, soil fauna promoted the mass loss of litter on average by 19.77%, the release of C (18.27%), nitrogen (N) (27.28%) and phosphorus (P) (12.68%), and the degradation of lignin and cellulose by 27.42% and 13.63%, respectively. However, the impact of soil fauna on the C/P was outstanding reduced by 21.58%. We did not find a significant contribution of soil fauna to the changes of C/N, C/P, N/P, lignin/cellulose, and lignin/N. Interestingly, we observed that micro- and mesofauna accelerate litter mass loss rather than macrofauna. Statistical analysis of model selection demonstrated that soil properties and the mesh size of litterbags (indicating the body size of soil fauna) played dominant roles in mass loss during litter decomposition. Additionally, the mesh size of litterbags was found to regulate the release of C, while the initial litter quality appeared to have a relatively important impact on the release of N and P. Our findings provide a more comprehensive understanding of the global contribution of soil fauna to litter decomposition, C and nutrients release, and quality changes mechanisms, highlighting the dominant role of initial litter quality in nutrient release. The findings support the inclusion of soil fauna in the global dynamic model of litter decomposition to make more accurate predictions concerning C sequestration, nutrient cycling, and nutrients balance, particularly in the context of global climate change.

关键词: soil fauna, litterbags method, mass loss, nutrient release, quality changes。